Sop #62

Title: Filmetrics Thin Film Measurement System v.1.5

reviewed by Chris Foreman on 11 Sep 1998.

Purpose:

This SOP outlines the startup, use, and shutdown of the Filmetrics system attached to the cleanroom PC. Measurements may be made with the base unit or with the microscope attachment. For specific details, a user manual is located in the cleanroom near the Filmetrics system.

Equipment:

Filmetrics system
Cleanroom PC

Chemicals and Supplies:

None

General Theory of Operation:

The Filmetrics system illuminates a sample with a tungsten-halogen white light source from 400nm to 3000nm with an effective measurement range from 400nm to 850nm. This is supplied via a fiber optic cable from the *light source output* port. The light reflected by the sample is then captured and fed back to the Filmetric unit via another cable to the spectrometer input port. The reflectivity spectrum of the sample is compared to an internal mathematical reflectivity spectrum for the given sample. A calculated curve is then fitted to the measured curve and the corresponding thickness of the calculated model is reported.

Procedure: with base unit

The Filmetrics system is on whenever it is plugged in to AC. The switch on the front panel is for the light source only.

1. Power on the light source by flipping the *light source switch* up.

   Open the software on the PC. It should be located in the Windows *Start* menu as *FILMeasure*. If the software reports problems at this point, it is likely the parallel cable is not attached or the Filmetrics system is not powered on. Otherwise, consult the lab technician.
2. Take a reference scan to initialize the modeling system to a known reference.

   Select Data Acquisition from the Set Up menu.
   Select Silicon as the reference material, should be default.
   With a clean silicon wafer, activate the *Measure Baseline* button. A silicon reference wafer is located with the Filmetrics system.
   Follow any directions from prompted dialog boxes.
   The *Subtract Dark* and *Use Reference* boxes should be checked now. Click OK when done.
3. Place your sample on the base unit under the fiber optic cable lens assembly. The small circular mirror in the base is where the measurement will be made.

4. Select your sample type from the *Structure* menu on the right hand side of the screen. For silicon dioxide, select SiO2.
5. Click the Measure button. The panel on the right hand side will indicate the thickness of the sample layer.

Procedure: with microscope attachment

1. The microscope light source will be used instead of the Filmetrics source.
2. Replace the video camera on the microscope with the Filmetrics microscope attachment.
3. Connect the fiber optic cable from the microscope attachment to the *spectrometer input* on the Filmetrics system.
4. Take reference scan as above.
5. The remaining steps are the same.

   Take the reference scan at the power you wish to measure.
   Do not adjust the microscope light source once the reference scan has been taken.
   Use the microscope stage to select an area to measure.
   Focus on the sample surface for all measurements.
   Lower magnification produces better readings, but insure the area to measure fills at least two thirds of the aperture.

Additional Info:

Measurements of the index of refraction and extinction coefficient is possible, as well as measuring multiple layers. The curve fitting and solution search parameters can also be tuned and additional sample types can be added to the *Structure* menu. For these situations, it is best to refer to chapter five of the Filmetrics manual for specific information.

[SOP LIST]